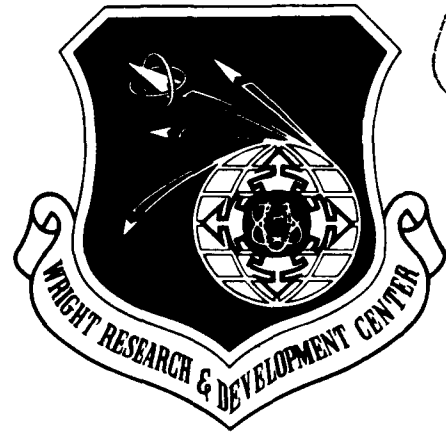**AD-A250 473**

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Volume V
Part 41

INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume V - Common Data Model Subsystem
Part 41 - CDM Impact Analysis User's Manual

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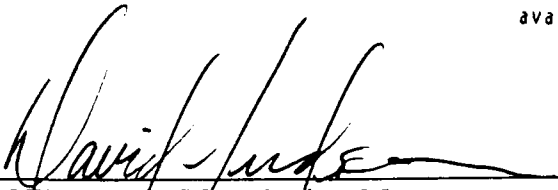WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6533

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This document is to be used by the Common Data Model Administrator (CDMA) to determine the impact a software change might have upon other software modules within the CDM subsystem. The CDM Impact Analysis Utility is used to identify and report which software modules and external schemas are affected by a change to the CDM.

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FOREWORD

This technical report covers work performed under Air Force
Contract F33600-87-C-0464, DAPro Project. This contract is
sponsored by the Manufacturing Technology Directorate, Air Force
Systems Command, Wright-Patterson Air Force Base, Ohio. It was
administered under the technical direction of Mr. Bruce A.
Rasmussen, Branch Chief, Integration Technology Division,
Manufacturing Technology Directorate, through Mr. David L. Judson,
Project Manager. The Prime Contractor was Integration Technology
Services, Software Programs Division, of the Control Data
Corporation, Dayton, Ohio, under the direction of Mr. W. A.
Osborne. The DAPro Project Manager for Control Data Corporation
was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test,
and demonstration of the Integrated Information Support System
(IISS). The IISS technology work comprises enhancements to IISS
software and the establishment and operation of IISS test bed
hardware and communications for developers and users.

The following list names the Control Data Corporation
subcontractors and their contributing activities:

SUBCONTRACTOR	ROLE
Control Data Corporation	Responsible for the overall Common Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.
Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface,and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

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List of Illustrations

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SECTION 1

INTRODUCTION

The CDM Impact Analysis Utility identifies and reports which software modules are affected by a change to the CDM and also identifies and reports affected external schemas used by these software modules. Changes to the CDM may also require the reprecompilation of Neutral Data Manipulation Language (NDML) software modules.

Intended Audience

This document is intended to be used by CDM administrators (CDMA), those who are responsible for making changes to the CDM and ensuring it remains in a consistent state.

SECTION 2

DOCUMENTS

2.1 Reference Documents

[1] Systran, ICAM Documentation Standards, 15 September 1983, IDS150120000C.

[2] Control Data Corporation, CDM Administrator's Manual, UM 620341000,31 May 1988.

[3] D. Appleton Company, CDM1, An IDEF1 Model of the Common Data Model, CCS620141000, 15 May 1985.

[4] Control Data Corporation, Neutral Data Definition Language User's Guide, UM620341100, 31 May 1988.

[5] C. J. Date, An Introduction to Database Systems, 1977, Addison-Wesley Publishing Company, Inc.

[6] Control Data Corporation, NDDL Development Specification, DS620341100, 31 May 1988.

[7] Control Data Corporation/D. Appleton Company, Conceptual Schema of CDM-1 for Cross References, 4 December 1985.

2.2 Terms and Abbreviations

Application Process: (AP), a cohesive unit of software that can be initiated as a unit to perform some function or functions.

Common Data: (CD), all the data of an enterprise.

Common Data Model: (CDM), IISS subsystem that describes common data of an enterprise and includes conceptual, external and internal schemas and schema transformations.

Common Data Model Administrator: (CDMA), the person or group of persons responsible for creating and maintaining an enterprises's Common Data Model. The CDMA manages the common data rather than managing applications that access data.

Common Data Model Processor: (CDMP), a component of the Common Data Model subsystem which is the distributed database manager of the IISS.

Conceptual Schema: (CS), the standard definition used for all data in the CDM. It is based on IDEF1 information modelling.

External Schema: (ES), an application's view of the CDM's conceptual schema.

Integrated Information Support System: (IISS), a computing environment used to investigate, demonstrate, test the concepts and produce application for information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous data bases supported by heterogeneous computers interconnected via a Local Area Network.

Internal Schema: (IS), the definition of the internal model, the storage structure definition, which specifies how the physical data are stored and how they can be accessed. It is represented in terms of the physical database components, including record types and inter-record relationships.

Neutral Data Definition Language: (NDDL), a language used to manipulate and populate information in the Common Data Model (CDM) or IISS System Database.

Neutral Data Manipulation Language: (NDML), a language developed by the IISS project to provide uniform access to common data, regardless of database manager or distribution criteria. It provides distributed retrieval, single node update and non-guaranteed distributed update.

Presentation Schema: (PS), the totality of the form fields in an application which are targets of data derivative from the common data.

SECTION 3

USING THE CDM IMPACT ANALYSIS

3.1 Overview

The CDM Impact Analysis reports software modules and external schemas affected by CDM changes. The generated reports are used to keep the software modules in a consistent state. The generated report contains: the name of the software module affected, the type of NDDL command causing the change and the ES changed by the command (view name and data items). Since some NDDL commands indirectly affect external schemas, the report also includes the sequence of the objects affected by the NDDL command. This provides the CDMA with enough information to either modify application programs to work with the new CDM model or revise the NDDL changes themselves.

Figure 3-1 outlines the three steps the CDM Impact Analysis uses to produce the reports.

Step	Description	Input	Output
one	checks NDDL command for application impacts	NDDL commands	schema objects affected by commands
two	trace schema object to external schema and determine the software impacted	affected schema objects	CDM Impact Tables
three	write reports from CDM Impact Tables	CDM Impact Tables	report of software modules being affected and trace of affected schema objects

Figure 3-1. CDM Impact Analysis Software Outline

Additional input to step two consists of the data base being changed. Additional input to step three consists of a cross reference relating software modules to external schema referenced by those modules (software modules/ES). This

cross-reference has been constructed during the precompilations of the software modules.

Each step of the CDM Impact Analysis is entirely completed before the next step starts. The output of one step is the input for the next.

3.2 Accessing the CDM Impact Analysis Facility

The CDM Impact Analysis is a software tool available in the IISS environment. To access this facility you enter CDMIMPACT in the function field on the IISS Function Screen. The following input screen is then displayed:

```
+----------------------------------------------------------------+
|              INTEGRATED INFORMATION SUPPORT SYSTEM             |
|                     CDM IMPACT ANALYSIS                        |
|                     --- ------ --------                        |
|                                                                |
|   Device Type: _____     Device Name: _____          |
|                                                                |
|   NDDL Commands File: _____                  |
|                                                                |
|   NDDL Commands:                                               |
|                                                                |
|      _____         |
|      _____         |
|      _____         |
|      _____         |
|                                                                |
|                                                                |
|  MSG: __                                        applcation     |
+----------------------------------------------------------------+
```

Figure 3-2. CDM Impact Analysis Input Form

3.2.1 Filling Out the Input Form

You use this form to enter the NDDL commands to be examined for impact and to specify where the generated reports are to be output.

Note: how you interact with forms is described in the IISS Terminal Operator Guide.

You use the Device Type and Device Name fields to specify where the generated reports are to be output. These fields are similar to the Device Type and Device Name fields on the IISS Function Screen. You can output the reports to a file, a hardcopy printer, or the terminal screen. To specify a printer enter SDPRINTERZ in the Device Type field. To specify a specific device, enter the name of a specific one in the Device Name field (ten characters long). To output the reports to a file, enter the name of an existing file in the Device Name field.

If you leave these fields blank, the report will be output on your terminal screen. They also will appear one after the other rather than remaining on the screen.

The other two fields on the form are used to input the NDDL commands. If you have many NDDL commands contained in a file, fill in the NDDL Commands File field with the filename. If you only have a few NDDL commands and prefer an interactive mode of access, fill in the NDDL Commands set of fields. This field limits you to commands totaling 350 characters.

The NDDL Commands File field receives the name of the file containing your NDDL commands. Use the NDDL Command File field to specify the name of the text file that contains the NDDL commands to be examined for impact. The file does not have to be in the current directory but its name is restricted to 30 characters.

The NDDL Commands set of fields you use to enter the NDDL Commands interactively. Enter them in a format acceptable to the NDDL command processor, separating successive commands with a semicolon and terminating them with the 'EXIT;' or 'HALT;' command.

After entering the appropriate information, press the <ENTER> key to begin the analysis. Pressing the <QUIT> key terminates the appliation and returns you to the IISS Function Screen.

SECTION 4

ANALYSIS OUTPUT

4.1 CDM Impact Tables

     The CDM Impact Analysis populates the following tables.
When the CDM Impact Analysis is started the rows of each of the
tables are deleted.

4.1.1 COMMANDS Table

     This table contains the following columns:

     com_no
     report_message
     user_id

     This table contains a list of NDDL commands. The com_no
is a number used to identify the command. The user_id specifies
which user has run this report.

4.1.2 OBJECT COM TRACE Table

     This table contains the following columns:

     com_no
     obj_type
     obj_name
     sequence_no
     user_id

     This table contains the trace of the objects affected by
an NDDL command. The com_no identifies the command in the
Commands table causing the impact. The sequence_no is an aid
for ordering the objects from internal schema through the
external schema. The obj_type and obj_name identify the object
being affected. The user_id specifies which user has run the
report. The form and values of sequence_no, obj_type, and
obj_name are as follows:

Sequence	Obj Type	Obj Name
1	DATA BASE	db_id
2	RECORD TYPE	db_id.rt_id
3	DATA FIELD	db_id.rt_id.df_id
3	RECORD SET	db_id.rt_id.set_id
4	HORIZONTAL PART	db_id.rt_id/ec_name
4	ECRTUD	db_id.rt_id.df_id/ec_name
4	PROJECT DATA FIELD	db_id.rt_id.df_id/ ec_name.tag_name
4	AUC ST MAPPING	db_id.rt_id.set_id/ ec_name.tag_name
4	RC BASED REC SET	db_id.rt_id.set_id/rc_name

Sequence	Obj Type	Obj Name
5	ENTITY CLASS	ec_name
5	ATTRIBUTE CLASS	ac_name
5	ATTRIBUTE USE CL	ec_name.tag_name
5	RELATION CLASS	rc_name
5	KEY CLASS	ec_name.kc_name
6	PROJECT DATA ITEM	ec_name.tag_name/ view_id.di_id
6	VIEW_EC_XREF	ind_ec_name ec_name dep_ec_name/view_id
7	DATA ITEM	view_id.di_id
7	USER VIEW	view_id

4.1.3 APPLICATION IMPACT Table

This table contains the following columns:

software_module
view_di_name
com_no
user_id

This table contains the information for the impact report. The software_module is the name of the software module which is impacted. The view_di_name is the external schema used by the software module. The com_no identifies the command impacting the software module. The user_id specifies which user has run this report.

4.2 Impact Reports

Two reports are generated automatically in the CDM Impact Analysis. Additional reports can be generated using the Report Writer since the internal CDM impact tables are available after the analysis. The CDM Impact deletes the previous report from the tables the next time it is run. The following sections describe the automatically generated reports. For the reports described in the next two sections the following NDDL command has been issued:

DROP VIEW ENGRG_PART;

4.2.1 The Impacted Software Modules Report

This report consists of the name of the software module impacted, the ES objects used by it, the user view and data item, and the command which caused the impact.

The format for this report is:

```
+----------------------------------------------------------------+
| MM/DD/YY          Impact of NDDL Commands            PAGE nnn  |
|                                                                |
|                                                                |
| Module      User View/Data Item            Command            |
|                                                                |
| AllC        ENGRG_PART.ENG_PART_ID           DROP VIEW ENGRG_PART|
|             ENGRG_PART.LATEST_APPROVED_REV DROP VIEW ENGRG_PART |
|             ENGRG_PART.ENG_PART_DESC         DROP VIEW ENGRG_PART|
|                          .                                     |
|                          .                                     |
|                          .                                     |
|                                                                |
+----------------------------------------------------------------+
```

Figure 4-1. Report Format of Impact of NDDL Commands

The information in this report is sorted by software module, user_view/data_item and command. The software module field is blank if it is the same as the previous line.

4.2.2   The Impacted Schema Objects Report

This report lists the command, the schema object type and name affected by it. The schema object types and names are listed in section 4.1.2.

The format for this report is:

```
+----------------------------------------------------------------+
| MM/DD/YY            Trace of NDDL Commands             PAGE nn |
|                                                                |
|                                                                |
| Objtype            Object Name            Command             |
|                                                                |
| USER VIEW          ENGRG_PART                drop view ENGRG_PART|
| DATA ITEM          ENGRG_PART.ENG_PART_ID  drop view ENGRG_PART |
| DATA ITEM          ENGRG_PART.LATEST_APPR  drop view ENGRG_PART |
| DATA ITEM          EMGRG_PART.ENG_PART_DE  drop view ENGRG_PART |
|                                                                |
|                                                                |
|                                                                |
+----------------------------------------------------------------+
```

Figure 4-2. Report Format of Trace of Impacts of NDDL Commands

Note: object type refers to what the object is used for and object name is simply the name one uses to access an object.

This report gets its input from the Commands and Object_Com_Trace tables. The report is sorted by Sequence_no, Command and Object_name.